

Accelerating ATM Optimization Algorithms Using High Performance Computing Hardware, Phase I

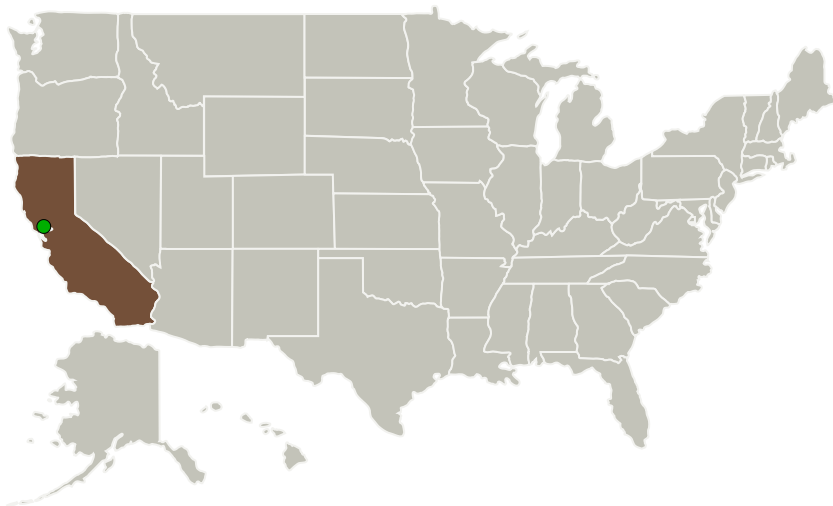
Completed Technology Project (2011 - 2011)



Project Introduction

NASA is developing algorithms and methodologies for efficient air-traffic management (ATM). Several researchers have adopted an optimization framework for solving problems such as flight scheduling, route assignment, flight rerouting, nationwide traffic flow management and dynamic airspace configuration. Computational complexity of these problems have led investigators to conclude that in many instances, real time solutions are computationally infeasible, forcing the use of relaxed versions of the problem to manage computational complexity. The primary objective of this research proposal is to accelerate optimization algorithms that play central roles in NASA's ATM research, by parallel implementation on emerging high performance computing (HPC) hardware. The proposed research effort will first identify optimization algorithms that are key to achieving NASA's ATM research objectives. The effort will then explore various avenues for parallelizing the optimization algorithms, and focus on algorithms most amenable for implementation on HPC hardware. The feasibility of implementing one or more optimization algorithms, and potential for further acceleration will be demonstrated on ATM problems of sufficient complexity, which will then form the basis for the Phase II prototype. Phase II work will develop an operational prototype of the algorithm implementation on HPC hardware, and deliver them to NASA for further evaluation.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Optimal Synthesis, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Transitions

**February 2011:** Project Start**September 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140176>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Optimal Synthesis, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Monish D Tandale

Co-Investigator:

Monish D Tandale

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.3 Traffic Management Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System